

WHAT IS CLAIMED IS:

1 1. A system for implementing a system acquisition function to facilitate
2 PN code searching, comprising:

3 a PN sequence generator configured to generate a plurality of PN sequences;
4 and

5 a plurality of computational units configurable to correlate a received signal
6 sample with a PN sequence generated by the PN sequence generator, the correlation being
7 executed in a parallel manner;

8 wherein a number of computational units from the plurality of computational
9 units are selectively configured to correlate the received signal sample with the PN sequence,
10 the number of computational units which are selectively configured to correlate the received
11 signal with the PN sequence depends on availability of the plurality of computational units.

1 2. The system according to claim 1 wherein the plurality of PN sequences
2 are generated in a sequential manner;

3 wherein the plurality of PN sequences includes a first PN sequence and a
4 second PN sequence, the second PN sequence immediately following the first PN sequence;
5 and

6 wherein the start of the second PN sequence is determined by shifting the first
7 PN sequence.

1 3. The system according to claim 1 wherein the PN sequence has M
2 components; and

3 wherein the number of computational units selectively configured to correlate
4 the received signal sample with the PN sequence is M or smaller.

1 4. The system according to claim 3 wherein the number of computational
2 units selectively configured to correlate the received signal sample with the PN sequence is
3 capable of being reduced if a clock rate driving the plurality of computational units is
4 increased.

1 5. The system according to claim 3 wherein the number of computational
2 units selectively configured to correlate the received signal with the PN sequence is capable
3 of being reduced if the availability of the plurality of computational units is reduced.

1 6. The system according to claim 1 wherein the received signal sample is
2 correlated with the PN sequence as soon as the received signal sample is received.

1 7. The system according to claim 6 wherein after correlating the received
2 signal sample with the PN sequence, the received signal sample is discarded.

1 8. The system according to claim 1 wherein one or more of the plurality
2 of computational units are configurable to implement another function when the PN code
3 searching is not needed.

1 9. The system according to claim 1 wherein the system acquisition
2 function is performed by a communication device.

1 10. The system according to claim 9 wherein the communication device is
2 a mobile phone for use in a CDMA communication system.

1 11. A system acquisition module for facilitating PN code searching,
2 comprising:
3 a PN sequence generator configured to generate a plurality of PN sequences;
4 and

5 a plurality of computational units configurable to correlate a plurality of
6 received signal samples with the plurality of PN sequences;
7 wherein each of the plurality of received signal samples is correlated with a
8 corresponding one of the plurality of PN sequences; and
9 wherein a number of computational units from the plurality of computational
10 units are selectively configured to correlate the plurality of received signal samples with the
11 plurality of PN sequences, the number of computational units which are selectively
12 configured to correlate the plurality of received signal samples with the plurality of PN
13 sequences depends on availability of the plurality of computational units.

1 12. The system acquisition module according to claim 11 wherein the
2 plurality of received signal samples is received in a sequential manner;
3 wherein the plurality of PN sequences is generated in a sequential order and
4 starting positions of any two adjacent PN sequences are offset by a chip.

1 13. The system acquisition module according to claim 12 wherein the
2 plurality of PN sequences includes a first PN sequence and a second PN sequence, the second
3 PN sequence immediately following the first PN sequence; and
4 wherein the start of the second PN sequence is determined by shifting the first
5 PN sequence.

1 14. The system acquisition module according to claim 12 wherein each of
2 the plurality of received signal samples is correlated with the corresponding one of the
3 plurality of PN sequences as soon as each of the plurality of received signal samples is
4 received.

1 15. The system acquisition module according to claim 14 wherein after
2 correlating a received signal sample with a corresponding PN sequence, the received signal
3 sample is discarded.

1 16. The system acquisition module according to claim 11 wherein each of
2 the plurality of PN sequences has M components; and
3 wherein the number of computational units selectively configured to correlate
4 the plurality of received signal samples with the plurality of PN sequences is M.

1 17. The system acquisition module according to claim 11 wherein the
2 number of computational units which are selectively configured to correlate the plurality of
3 received signal samples with the plurality of PN sequences is capable of being reduced if a
4 clock rate driving the plurality of computational units is increased.

1 18. The system acquisition module according to claim 11 wherein the
2 number of computational units which are selectively configured to correlate the plurality of
3 received signal samples with the plurality of PN sequences is capable of being reduced if the
4 availability of the plurality of computational units is reduced.

1 19. The system acquisition module according to claim 11 wherein one or
2 more of the plurality of computational units are configurable to implement another function
3 when the PN code searching is not needed.

1 20. The system acquisition module according to claim 11 wherein the
2 system acquisition module is located in a communication device.

1 21. The system acquisition module according to claim 20 wherein the
2 communication device is a mobile phone for use in a CDMA communication system.

1 22. A communication device having a system acquisition function,
2 comprising:
3 a receiver configured to receive a plurality of signal samples;
4 a PN sequence generator configured to generate a plurality of PN sequences,
5 the PN sequence generator being implemented by selectively using one or more of a first
6 plurality of configurable computational units; and
7 a correlator configured to correlate the plurality of signal samples with the
8 plurality of PN sequences, the correlator being implemented by selectively using one or more
9 of a second plurality of configurable computational units, the number of configurable
10 computational units to be selectively used to implement the correlator depending on
11 availability of the second plurality of configurable computational units.

1 23. The communication device according to claim 22 wherein the plurality
2 of signal samples is received in a sequential manner;
3 wherein the plurality of PN sequences is generated in a sequential order; and
4 wherein each of the plurality of signal samples is correlated with a
5 corresponding one of the plurality of PN sequences.

1 24. The communication device according to claim 23 wherein the plurality
2 of PN sequences includes a first PN sequence and a second PN sequence, the second PN
3 sequence immediately following the first PN sequence; and
4 wherein the start of the second PN sequence is determined by shifting the first
5 PN sequence.

1 25. The communication device according to claim 23 wherein each of the
2 plurality of signal samples is correlated with the corresponding one of the plurality of PN
3 sequences as soon as each of the plurality of signal samples is received.

1 26. The communication device according to claim 25 wherein after
2 correlating a signal sample with a corresponding PN sequence, the signal sample is discarded.

1 27. The communication device according to claim 22 wherein each of the
2 plurality of PN sequences has M components; and
3 wherein the number of configurable computational units to be selectively used
4 to implement the correlator to correlate the plurality of signal samples with the plurality of
5 PN sequences is M.

1 28. The communication device according to claim 22 wherein the number
2 of configurable computational units which are to be selectively used to implement the
3 correlator to correlate the plurality of signal samples with the plurality of PN sequences is
4 capable of being reduced if a clock rate driving the second plurality of configurable
5 computational units is increased.

1 29. The communication device according to claim 22 wherein the number
2 of configurable computational units which are to be selectively used to implement the
3 correlator to correlate the plurality of signal samples with the plurality of PN sequences is
4 capable of being reduced if the availability of the second plurality of configurable
5 computational units is reduced.

1 30. The communication device according to claim 22 wherein one or more
2 of the second plurality of configurable computational units are configurable to implement
3 another function when the system acquisition function is not needed.

1 31. The communication device according to claim 22 wherein the
2 communication device is a mobile phone for use in a CDMA communication system.

1 32. A communication device having a system acquisition function,
2 comprising:
3 a receiver configured to receive a plurality of signals;
4 a PN sequence generator configured to generate a plurality of PN sequences,
5 the PN sequence generator being implemented by selectively using one or more of a plurality
6 of configurable computational units; and
7 a correlator configured to correlate the plurality of signals with the plurality of
8 PN sequences, the correlator being implemented by selectively using one or more of the
9 plurality of configurable computational units;

wherein the number of configurable computational units to be selectively used to implement the correlator depend on availability of the plurality of configurable computational units.

33. The communication device according to claim 32 wherein the plurality of signals is received in a sequential manner; wherein the plurality of PN sequences is generated in a sequential order; and wherein each of the plurality of signals is correlated with a corresponding one of the plurality of PN sequences.

34. The communication device according to claim 33 wherein the plurality of PN sequences includes a first PN sequence and a second PN sequence, the second PN sequence immediately following the first PN sequence; and wherein the start of the second PN sequence is determined by shifting the first PN sequence.

35. The communication device according to claim 32 wherein each of the plurality of signals is correlated with the corresponding one of the plurality of PN sequences as soon as each of the plurality of signals is received.

36. The communication device according to claim 35 wherein after correlating a signal with a corresponding PN sequence, the signal is discarded.

37. The communication device according to claim 32 wherein each of the plurality of PN sequences has M components; and wherein the number of configurable computational units to be selectively used to implement the correlator to correlate the plurality of signals with the plurality of PN sequences is M or smaller.

38. The communication device according to claim 32 wherein the number of configurable computational units which are to be selectively used to implement the correlator to correlate the plurality of signals with the plurality of PN sequences is capable of being reduced if a clock rate driving the plurality of configurable computational units is increased.

1 39. The communication device according to claim 32 wherein the number
2 of configurable computational units which are to be selectively used to implement the
3 correlator to correlate the plurality of signals with the plurality of PN sequences is capable of
4 being reduced if the availability of the plurality of configurable computational units is
5 reduced.

1 40. The communication device according to claim 32 wherein one or more
2 of the plurality of configurable computational units are configurable to implement another
3 function when the system acquisition function is not needed.

1 41. The communication device according to claim 32 wherein the
2 communication device is a mobile phone for use in a CDMA communication system.

1 42. A system for implementing a system acquisition function to facilitate
2 PN code searching, comprising:

3 a PN sequence generator configured to generate a plurality of PN codes, one
4 or more PN codes making up a PN sequence; and

5 a plurality of computational units configurable to correlate a plurality of
6 received signals with a plurality of PN sequences;

7 wherein a number of computational units from the plurality of computational
8 units are selectively configured to correlate the plurality of received signals;

9 wherein for each received signal, each configured computational unit
10 correlates the received signal with a corresponding PN code of a first PN sequence and stores
11 a correlation result, all the configured computational units perform their respective
12 correlations upon receiving the received signal and in a parallel manner.

1 43. The system of claim 42 wherein after each received signal is
2 correlated, a second PN sequence is generated by shifting the first PN sequence and adding
3 an additional PN code; and

4 wherein upon receiving a next received signal, each configured computational
5 unit correlates the next received signal with a corresponding PN code of the second PN
6 sequence and accumulates a correlation result with the correlation result from the previously
7 correlated received signal.

1 44. The system of claim 42 wherein the number of configured
2 computational units is scalable.

1 45. The system of claim 42 wherein the number of configured
2 computational units is capable of being reduced if performance of the plurality of
3 computational units is increased.

1 46. The system of claim 42 wherein after each received signal is
2 correlated, the received signal is discarded.

1 47. A method for implementing a system acquisition function to facilitate
2 PN code searching, comprising:
3 maintaining a plurality of configurable computational units;
4 receiving a plurality of signals;
5 configuring one or more of the plurality of configurable computational units to
6 implement a PN sequence generator to generate a plurality of PN sequences;
7 configuring one or more of the plurality of configurable computational units to
8 implement a correlator to correlate the plurality of signals with the plurality of PN sequences;
9 and
10 correlating each one of the plurality of signals with a corresponding one of the
11 plurality of PN sequences at the time when each one of the plurality of signals is received;
12 wherein the number of configurable computational units used to implement
13 the correlator depends on availability of the plurality of configurable computational units.

1 48. The method of claim 47 further comprising:
2 generating the plurality of PN sequences in a sequential manner, wherein the
3 plurality of PN sequences include a first PN sequence and second PN sequence, the second
4 PN sequence immediately following the first PN sequence, and wherein the start of the
5 second PN sequence is determined by shifting the first PN sequence.

1 49. The method of claim 47 wherein the number of configurable
2 computational units used to implement the correlator is capable of being reduced if a clock
3 rate driving the plurality of configurable computational units is increased.

1 50. The method of claim 47 wherein the number of configurable
2 computational units used to implement the correlator is capable of being reduced if the
3 availability of the plurality of configurable computational units is reduced.

1 51. The method of claim 47 wherein one or more of the plurality of
2 configurable computational units are configurable to implement another function when the
3 system acquisition function is not needed.

1 52. A communication device utilizing the method of claim 47.

1 53. The method of claim 52 wherein the communication device is a mobile
2 phone for use in a CDMA communication system.

1 54. A method for implementing a system acquisition function to facilitate
2 PN code searching, comprising:
3 generating a first PN sequence, the first PN sequence being made up of a
4 plurality of PN codes;
5 receiving a first signal;
6 correlating the first signal with the first PN sequence upon receiving the first
7 signal;
8 storing a correlation result from the correlation between the first signal and the
9 first PN sequence;
10 generating a second PN sequence by shifting the first PN sequence and adding
11 an additional PN code;
12 receiving a second signal;
13 correlating the second signal with the second PN sequence;
14 accumulating a correlation result from the correlation between the second
15 signal and the second PN sequence with the correlation result from the correlation between
16 the first signal and the first PN sequence; and
17 repeating the above generating, receiving, correlating and accumulating steps
18 with each received signal and each newly generated PN sequence.

1 55. The method of claim 54 wherein the generating step further comprises:
2 configuring one or more of a plurality of configurable computational units to
3 implement the generation function; and

4 wherein the correlating step further comprises:
5 configuring one or more of the plurality of configurable computational units to
6 implement the correlation function, the number of configurable computational units to be
7 configured to implement the correlation function depends on the availability of the plurality
8 of configurable computational units.

1 56. The method of claim 55 wherein the number of configurable
2 computational units to be configured to implement the correlation function is capable of
3 being reduced if a clock rate driving the plurality of configurable computational units is
4 increased.

1 57. The method of claim 55 wherein the number of configurable
2 computational units to be configured to implement the correlation function is capable of
3 being reduced if the availability of the plurality of configurable computational units is
4 reduced.

1 58. The method of claim 55 wherein one or more of the plurality of
2 configurable computational units are configurable to implement another function when the
3 system acquisition function is not needed.